

Wind Cave restoration guided by balancing cultural and natural resource preservation

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IN THE 1890S, when early developers of Wind Cave, South Dakota, blasted narrow passages to create public tour routes, they were making history. They were also altering the cave's fragile natural conditions. Many resource managers in the National Park Service are acrobats in the balancing act of cultural vs. natural resources, but this is the first time this act has been performed with the help of a cultural landscape survey in an NPS-administered cave. A project to restore the Natural Entrance Tour Route in Wind Cave was funded in FY 2003 through the Natural Resource Preservation Program and led to the detailed survey.

In November 2002, a team of historical building and landscape architects pioneered new ground as they evaluated cultural cave resources along the Natural Entrance Tour Route. Until that time the National Park Service had never completed a cultural landscape survey in a cave, so no previous work in a similar setting could guide the team. As they explored "new territory," the team identified cultural resources such as trails, handrails, stairs, retaining walls, artifacts (e.g., 25¢ cave tickets, flash-powder bottles, Lucky Strike cigarette packs, and wine bottles), signatures etched on cave walls, blast holes, and trail-construction debris. Although much of the debris would be removed to restore the cave's natural conditions, the cultural landscape survey team made preliminary recommendations that called for intentionally placed rocks lining the trail, or for leaving particular deposits that were not blocking cave passages in place.

In addition to early developers, the Civilian Conservation Corps further modified tour routes in the 1930s and park staff paved trails with asphalt in 1956. These projects amassed a tremendous amount of debris, including blast rock, gravel, sand, displaced sediment, asphalt, concrete, and wood. Workers dumped most of this construction debris in side passages, altering the natural environment. They also used it to level walkways. More subtle human impacts include dust, lint, hair, and skin flakes shed from 90,000 annual visitors, and dust from development, which has built up on all cave surfaces. This material dissolves and hides the true colors of cave formations and provides unnatural food sources for cave biota.

In preparation for this project, staff mapped and digitized the locations of artificial-fill deposits along three developed tour routes within the cave. They photographed each deposit for later comparison with the restored sites. Preparation work also involved compliance with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act, including consultation with 19 Native American tribes with cultural affiliations with the park. In addition, a representative of the State Historic Preservation Office visited the cave to discuss how to manage any cultural artifacts found during the project.

The team of seven seasonal laborers did not restore as much of the trail as originally planned. Seasonal staff found artificial-fill deposits to be much deeper than expected; many of these deposits were more than 5 feet (1.5 m) deep and contained tons of debris, which had to be



An arduous restoration project at Wind Cave transformed Lena's Cave (pictured) and other features along three developed tour routes from a debris-covered depression (top) to a natural-functioning and -looking cave passageway (bottom). Park staff removed 36 tons of blast rock, gravel, sand, and other materials that were deposited when the access trails were constructed, revealing rich cave detail and color.

manually hauled out of the cave. Nevertheless, by the end of the six-month project, staff had restored 750 feet (229 m) of the tour route and removed 36 tons of debris from the cave, resulting in a dramatic improvement of the natural cave environment.

This project was the first phase of a multiyear project to mitigate impacts of development and more than 100 years of touring. The cultural landscape survey was integral to protecting and preserving both natural and cultural resources in the cave. Using what was learned during this initial phase, park staff is confident that future projects will complete the restoration of the remaining paved tour routes in Wind Cave. ■

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